

## ***Interactive comment on “Air Density Induced Error on Wind Energy Estimation” by Aurore Dupré et al.***

**Aurore Dupré et al.**

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First of all thank you for your comment. We should have specify the context more clearly. This study targets small structures like wind energy producers with small wind farms. Typically, this work was conducted thanks to a wind energy producer called Zephyr ENR who owns 6 farms with six wind turbines each. In this context, the accuracy of the forecasts is crucial.

According to IEC, the density normalization should be applied when the air density differs by more than  $0.05 \text{ kg m}^{-3}$  from the standard air density. This is not the case for the considered wind farm. However, we have shown that even if the variation in the air density seems weak over the entire year, during summer or winter taking into account those variations leads to an improvement of nearly 40% in the wind energy modeling. Then, this should not be neglected.

Using the standard temperature and pressure in the formula means not taking them into account. Consequently we do not explore the error that occurs when standard air pressure and temperature are used but we explore the error when pressure and temperature are neglected. Then, we compare those cases with the cases where they are considered. Indeed, small companies cannot necessarily afford to pay for analyses, hence the study on the neglect of the pressure or temperature term.

In this study, the impact of density variations on the wind power modeling is accurately quantified using in-situ data over 3 years. The use of in-situ data, especially over such a long period of time, is not systematic in the literature and that is one of the strengths of this study. We use the simplest method in order to demonstrate that even this naive approach allows significant improvements. The literature review presents the other methods and their associated improvements. It has been expanded thanks to the referee's comment.

Finally, thank you for noticing the highest values of MAE and BIAS in Table 5. Those values were in kW instead of %. This has been corrected.

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Discussion paper

